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| 09/136,342 | 08/19/98 | FORREST | S 10020/11901 |

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EXAMINER

YAMNITZKY, M

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1774

13

DATE MAILED: 10/23/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/136,342

Applicant(s)
Stephen R. FORREST et al.

Examiner
M. Yamnitzky

Group Art Unit
1774



☒ Responsive to communication(s) filed on Jul 31, 2000

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three (3) month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 29-35 and 54-63 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 29-35 and 54-63 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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1. This Office action is in response to applicants' amendment received 07/31/00 (Paper No. 12) which amends the specification, cancels claims 1-28 and 36-53, amends claims 29-31 and adds claims 54-63.

Claims 29-35 and 54-63 are pending.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. The rejections as set forth in Paper No. 10 are overcome by applicants' amendment of claims 29-31 and/or rendered moot by the cancellation of claims 1-28 and 36-53.

3. Clarification/verification regarding the change to page 42, line 12 is requested. Applicants have changed "08/876666" to --04/976,666-- (emphasis added). Should this instead read --08/976,666--?

4. In Paper No. 12, applicants state that it is not clear whether the examiner has considered the copending applications listed on the PTO-1449 filed 11/23/98. Applicants point out that the applications were disclosed in accord with PTO rules and the examiner has a duty to consider them. Applicants request the examiner to review the disclosed applications and provide an initialed PTO-1449 or PTO-892 form listing the applications.

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The examiner is aware of her duty and respectfully points out that she has considered the applications. This can be seen by looking at page 2 of 3 of the initialed and signed PTO-1449 filed 11/23/98, the examiner having initialed, signed and dated the form on 01/27/00. The examiner's initials appear next to the first document (a copending application) listed on the page and next to the last document (a literature reference) listed on the page. An arrow is drawn from the first set of initials to the second set of initials, indicating that the examiner has considered the first document, the last document, and every document in between.

The copending applications have been crossed off the list because they are not available to the general public and should not be listed in the references cited section of a patent. The examiner acknowledges that there are patents that list copending applications in the references cited section, but this should not be done. If applicants wish to destroy the secrecy of their copending applications by disclosing them in the specification, they may do so. The examiner will not destroy the secrecy of applicants' copending applications by having them listed in the references cited section of any patent issuing from the present application.

5. Claims 29-35 and 54-56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In amending claim 29 to be an independent claim, applicants have deleted the spatial relationship between the two electrode layers and the four photoconductive organic layers. The

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examiner suggests inserting --, disposed between said two transparent electrode layers-- after "outer pair" in order to overcome this rejection.

6. Claims 29, 30, 32-34 and 54-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (5,350,459) in view of Sariciftci et al. (5,331,183).

See the whole Suzuki patent. In particular, see column 1, lines 6-9, c. 4, lines 3-23, c. 4, l. 39-49, c. 40, l. 33-44, c. 41, l. 20-34, and c. 43, l. 19-25.

Suzuki et al. require that "at least one" of the first or second electrode be transparent. Although there is no requirement for two transparent electrodes, two transparent electrodes is clearly within the scope of Suzuki's "at least one". It would have been obvious to one of ordinary skill in the art at the time of the invention to make the organic photovoltaic element of Suzuki et al. with two transparent electrodes so as to attain the advantages provided by having two transparent electrodes such as being able to expose the photoconductive layers to electromagnetic radiation through either electrode.

Suzuki et al. do not disclose a device having two transparent electrodes that are metal substitute electrode layers such as electrode layers made of conductive oxides or conductive polymers. Suzuki et al. teach the use of metal oxide (indium tin oxide, tin oxide, and indium oxide) for the electrode which must be transparent, and teach the use of metals for the other electrode.

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Sariciftci et al. disclose photosensitive optoelectronic devices and teach that one conducting electrode layer may be a metal layer, a conducting layer made of mixed oxides such as indium/tin oxide, or a conducting polymer layer such as polyaniline, and that a second conducting layer which is required to be a transparent conducting layer may be a conducting layer made of mixed oxides such as indium/tin oxide or a conducting polymer layer such as polyaniline. In particular, see column 5, lines 39-48 and c. 6, lines 6-17 of the Sariciftci patent.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use a conductive metal oxide such as indium/tin oxide or a conducting polymer such as polyaniline to make a photovoltaic device according to Suzuki et al. having two transparent electrodes. One of ordinary skill in the art would have been motivated to do so by Sariciftci's disclosure of conductive polymers and conductive metal oxides as equivalents of metal in the manufacture of electrodes for a photovoltaic device, and by Sariciftci's disclosure of conductive polymers such as polyaniline and conductive metal oxides such as indium tin oxide as equivalents in the manufacture of transparent electrodes for a photovoltaic device.

7. Applicants' arguments filed 07/31/00 regarding the patentability of the present claims over the Suzuki patent have been fully considered. The patent to Sariciftci et al. demonstrates that electrodes of conducting metal oxides and electrodes of conducting polymers were known in the art at the time of the invention as suitable alternatives to metal electrodes, and conducting metal oxides and conducting polymers were known in the art at the time of the invention as equivalents

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for the manufacture of transparent electrodes. Thus, the present claims are considered to be unpatentable over Suzuki et al. in view of Sariciftci et al.

New claim 57 is said to correspond to previous claims 25 and 26 which had not been rejected as unpatentable over Suzuki et al in Paper No. 10. The examiner had not rejected claims 25 or 26 using the Suzuki patent because she had interpreted claims 25 and 26 as being drawn to a device having two, and only two, photoconductive organic layers between two transparent electrodes. This interpretation was made because these two claims depended from claim 24 which depended from claim 23 which limited said at least one photoconductive organic layer to two photoconductive organic layers and limited said at least two electrode layers to two electrode layers. This Office action is not made final because the examiner's interpretation of claims 25 and 26 may have been too narrow. Claim 57 utilizes open claim language and, while not requiring more than two ("a pair of") photoconductive layers disposed between two electrode layers, does not exclude additional photoconductive layers.

8. The previously applied patent to Kay et al. (3,900,945) is also of interest for the disclosure of gold, silver, tin oxide and platinum as equivalents for electrodes in a photovoltaic device.

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9. Claims 31 and 35 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

These claims require that the inner pair of four photoconductive organic layers consist of a pair of organic layers selected to form a photovoltaic heterojunction and to have a spectral sensitivity in a specified region of the electromagnetic spectrum, wherein the pair of organic layers comprises aluminum tris(8-hydroxyquinoline) and 4,4'-bis[N-1-naphthyl]-N-phenyl-amino] biphenyl. No art of record discloses or suggests a photosensitive optoelectronic device comprising this inner pair of photoconductive organic layers.

10. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner can generally be reached at this number from 6:45 a.m. to 3:15 p.m. Monday-Friday.

The current fax numbers for Art Unit 1774 are (703) 305-3599 for official after final faxes and (703) 305-5408 for all other official faxes. (Unofficial faxes for Art Unit 1774 can be sent to (703) 305-5436.)

MRY
10/22/00



MARIE YAMNITZKY
PRIMARY EXAMINER

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